Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

PHYSICS 0625/2

PAPER 2

MAY/JUNE SESSION 2000 1 hour

Candidates answer on the question paper.
Additional materials:
Electronic calculator and/or Mathematical tables
Ruler (30 cm)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
You may lose marks if you do not show your working or if you do not use appropriate units.
Take the weight of 1 kg to be 10 N (i.e. acceleration of free fall = 10 m/s^2).

FOR EXAMINER'S USE

This question paper consists of 15 printed pages and 1 blank page.

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[Turn over

1 Read the sentences below and then answer the questions which follow.

"When potatoes are bought in a market, the weight of a bag full of potatoes is affected by the density of the potatoes. A lady fills her bag when she buys 5 kg of large potatoes. A man buys 5 kg of small potatoes. He puts them in a bag of the same size as the lady's, but his bag is not filled."

(a) Which word in these sentences describes a quantity which is a force?

.....[1]

(b) What does the 5 kg measure? Tick **one** box.

the density of the potatoes	☐
the mass of the potatoes	☐
the volume of the potatoes	☐
the weight of the potatoes	☐

[1]

(c) Suggest one reason why the man's 5 kg of potatoes occupies less volume than the lady's potatoes.

.....[1]

2 A dish of hot food is put on a wooden table.

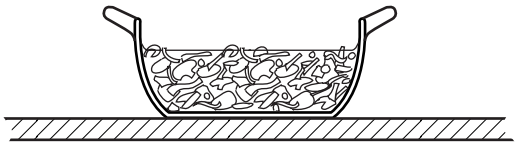


Fig. 2.1

(a) State three processes by which the dish and its contents could lose heat to the surroundings.

1. .....

2. .....

3. .....[3]

(b) **(i)** Describe one way of reducing the heat loss to the surroundings.

.....

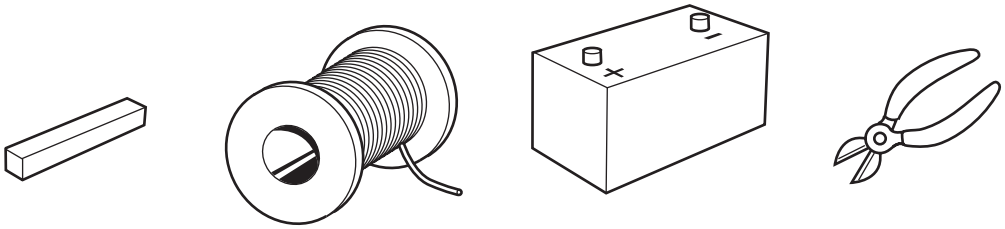
.....

(ii) Which form of heat loss would this reduce?

.....[2]

For Examiner's Use

3 You are given an iron bar, a reel of insulated wire, a battery and some wire cutters.



iron bar | reel of insulated wire | battery | wire cutters

Fig. 3.1

(a) In the space below, describe how you would make an electromagnet. You may use a labelled diagram if it helps you to answer the question.

.....

.....

.....[3]

(b) How would you check that your electromagnet actually works?

.....

.....

.....[1]

For Examiner's Use

4 At night, the light beam from a torch is shone into a swimming pool along the line TSA. Instead of striking the bottom of the pool at A, the beam travels to B, as shown on Fig. 4.1.

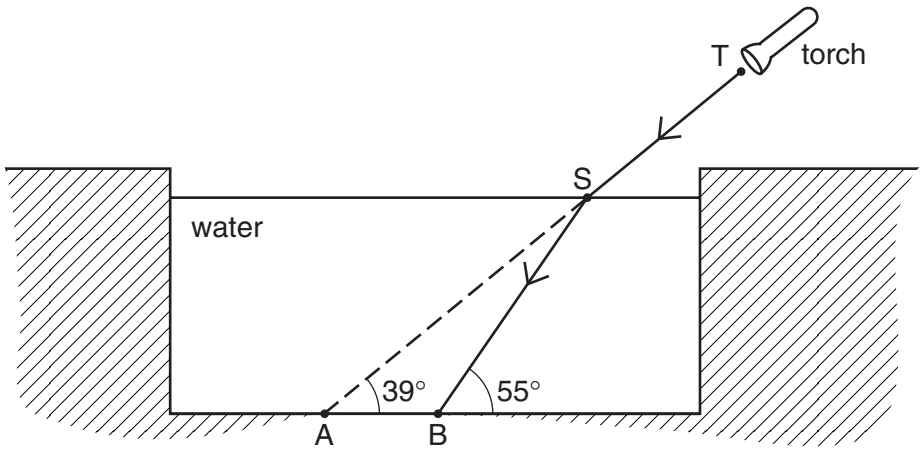


Fig. 4.1

(a) At S, the direction of the beam changes. State the name we use to describe this change.

.....[1]

(b) **(i)** On Fig. 4.1, draw the normal to the surface at S.

(ii) Clearly mark and label the angle of incidence. [2]

(c) Fig. 4.2 shows the same pool and the same points A, B, S and T. The critical angle for the water is 50°.

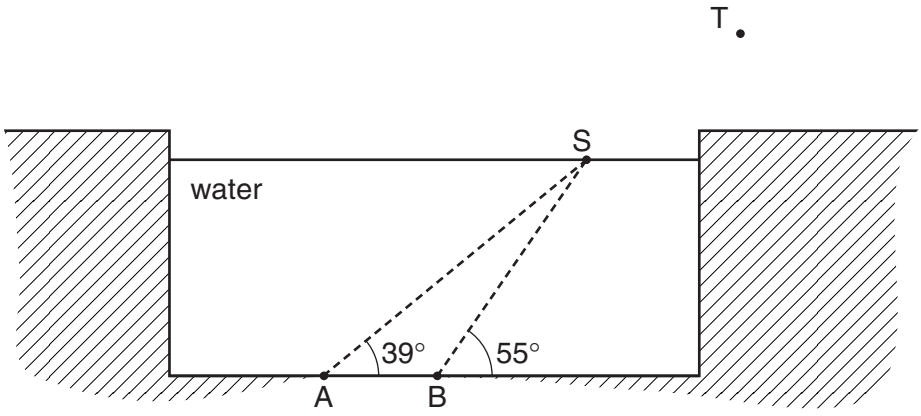


Fig. 4.2

(i) A beam of light is directed up from B to S. On Fig. 4.2, carefully draw the path of the ray from B to S and then out into the air.

(ii) 1. A beam of light is directed up from A to S. Describe what happens to the beam at S.

.....

.....

2. Explain why this happens.

.....

.....[4]

5 A man is watching a thunderstorm which is directly over a village. Some distance behind the village is a mountain.

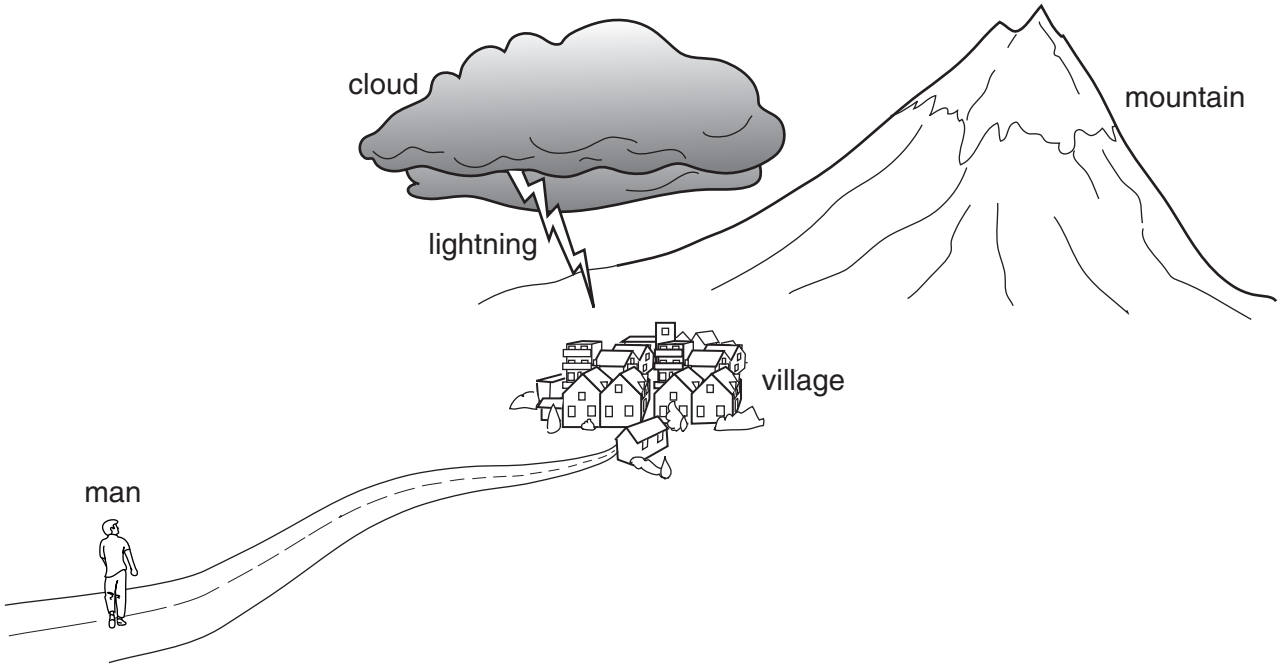


Fig. 5.1

(a) Thunder is created at the same time as the lightning flash but, after the man sees a lightning flash, he has to wait a short time before he hears the thunder.

Why is there this delay?

.....

.....

.....

.....[2]

(b) When he listens carefully, the man realises that, for each lightning flash, he can hear a loud sound of thunder followed by a quieter one.

(i) After studying Fig. 5.1, explain why he hears two sounds for each lightning flash.

.....

.....

(ii) Suggest why the second sound is quieter.

.....

.....[2]

For Examiner's Use

(c) The man measures the time between seeing a flash of lightning over the village, and hearing the first sound of thunder. The time is 4 s.

The speed of sound in air is 330 m/s.

How far away is the village?

ANSWER: ..... m [3]

6 Some smoke is mixed with the air in a glass box. The box is lit brightly from the side and its contents studied from above through a microscope.

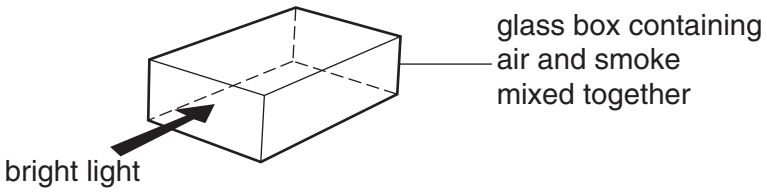


Fig. 6.1

(a) Bright specks are seen moving in continuous and jerky random movement.

(i) What are the bright specks? Tick **one** box.

air molecules ☐

smoke molecules ☐

smoke particles ☐

(ii) What is the explanation for the jerky random movement? Tick **one** box.

The air molecules bombard each other. ☐

The smoke particles bombard each other. ☐

The air molecules bombard the smoke particles. ☐

The air molecules bombard the glass. ☐

The smoke particles bombard the glass. ☐ [2]

(b) The contents of the glass box exert a pressure on the glass walls.
Tick **any** of the following sentences which might help explain this pressure.

The air molecules bombard each other. ☐

The smoke particles bombard each other. ☐

The air molecules bombard the smoke particles. ☐

The air molecules bombard the glass. ☐

The smoke particles bombard the glass. ☐ [2]

For Examiner's Use

7 Fig. 7.1 shows one way of using water to generate electricity.

(a) Fill in the missing words in the boxes. [4]

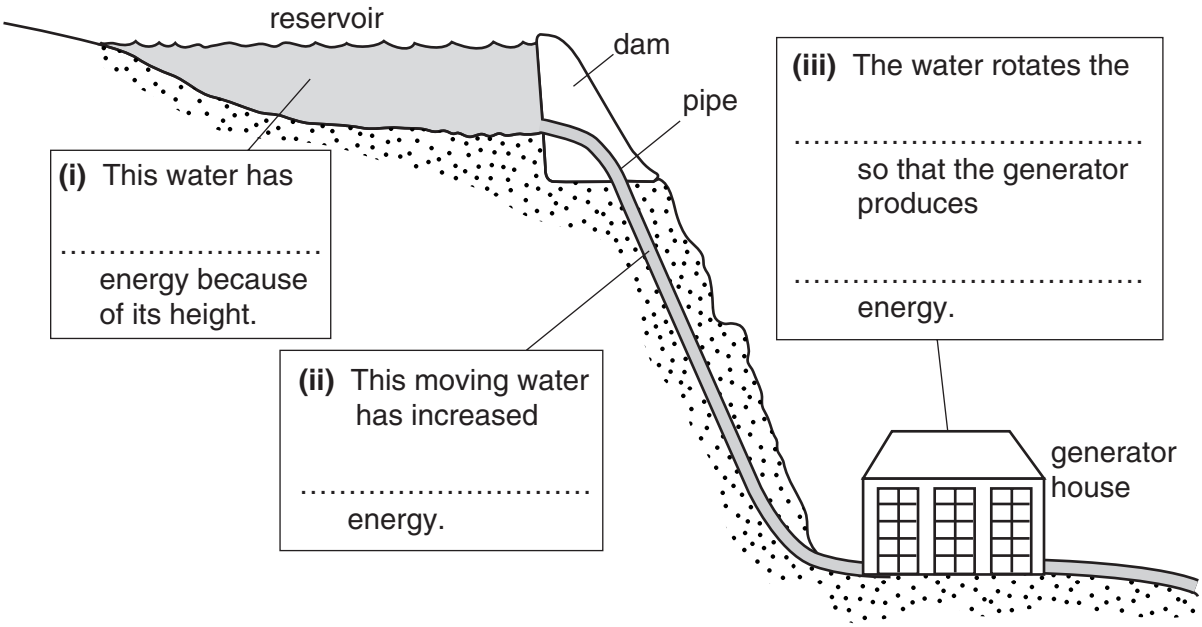


Fig. 7.1

(b) In other places, water is used in different ways to generate electricity.
State two of these ways.

1. .....

2. .....[2]

For Examiner's Use

8 This question deals with the decay of a radioactive source.
The radioactive source has a count rate of 640 counts/minute at the start of an experiment.
This value has been plotted on Fig. 8.1.

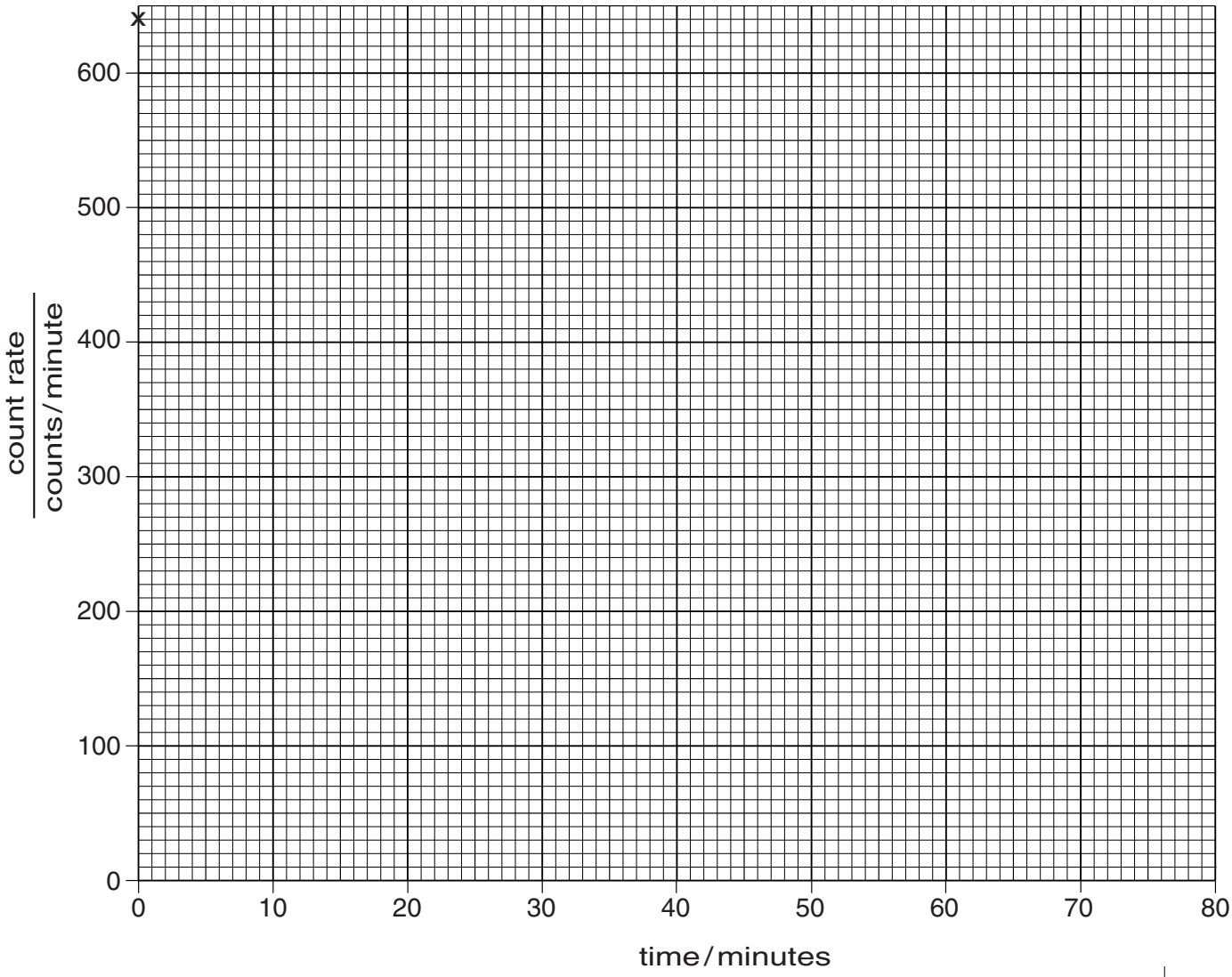


Fig. 8.1

The source has a half-life of 20 minutes.

(a) (i) What would you expect the count rate to be after 20 minutes?

..... counts/minute

(ii) Plot this value on the graph. [2]

(b) (i) What would you expect the count rate to be after a further 20 minutes (i.e. 40 minutes after the start of the experiment)?

..... counts/minute

(ii) Plot this value on the graph. [2]

(c) Plot two further points which might be expected if the decay curve were perfect. [1]

(d) Draw a smooth curve through all five points on your graph. [1]

(e) If this perfect decay continued, how long would it take from the beginning of the experiment for the count rate to decrease to zero?

Tick **one** answer.

90 minutes	☐
100 minutes	☐
120 minutes	☐
a very long time	☐
an infinite time	☐

[1]

(f) In a real experiment, the values found for the count rates might not all lie exactly on a smooth curve. One reason for this might be experimental error. State one other reason.

.....[1]

9 **(a)** Heavy furniture sometimes marks the floor on which it stands.
Four tables of the same weight each have four legs. Fig. 9.1 shows part of a leg from each table.

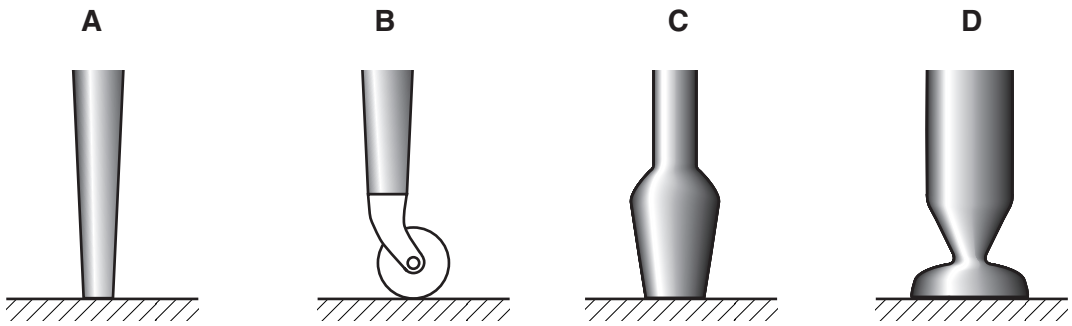


Fig. 9.1

(i) Which leg is least likely to mark the floor underneath it? .....

(ii) Explain your answer.

.....

.....[3]

(b) A hot flat metal sheet is placed on a horizontal surface.

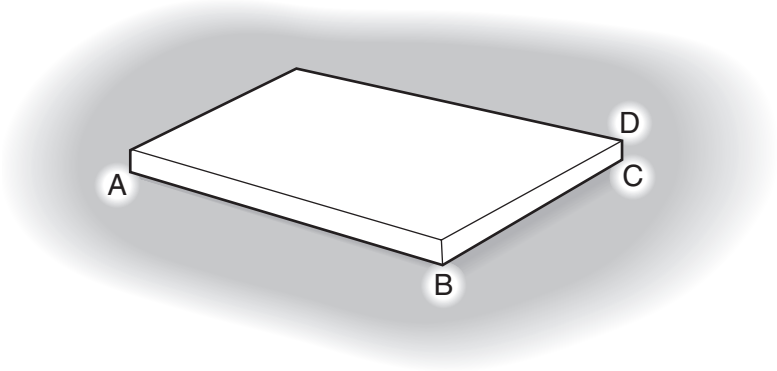


Fig. 9.2

As the hot metal sheet cools, what happens to the quantities in the list below? Tick **one** answer for each.

	increases	decreases	stays the same
length AB			
width BC			
thickness CD			
area touching the horizontal surface			
mass of sheet			
weight of sheet			
density of metal			
pressure on horizontal surface			

[6]

10 A laboratory technician wants to make a resistor of value 64 Ω, using some resistance wire. He takes 1.0 m of this wire. The wire is shown in Fig. 10.1 as AC. He connects up the circuit shown.

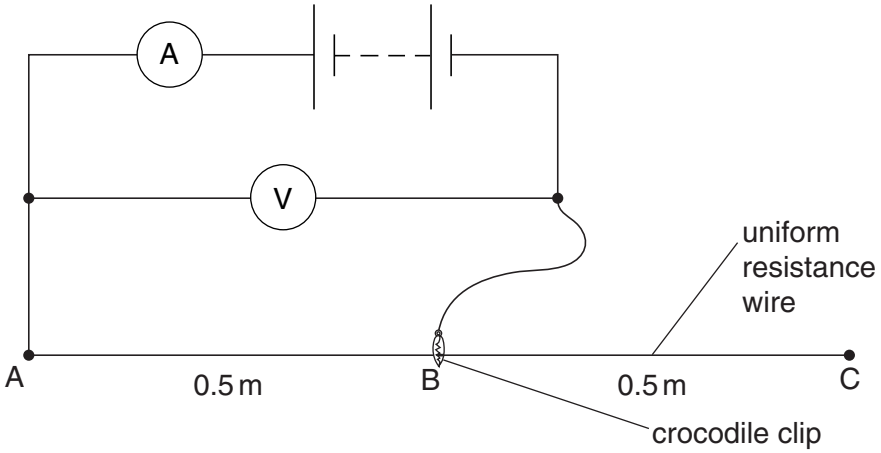


Fig. 10.1

(a) He connects the crocodile clip at B, which is 0.5 m from A.
Here are the readings he gets.

voltmeter reading 12 V

ammeter reading 1.5 A

Calculate the resistance of wire AB.

ANSWER: resistance of AB = ... Ω [3]

(b) The laboratory technician now connects the crocodile clip to C, to measure the resistance of 1 m of the wire. The wire has constant thickness.

(i) In the spaces below, write the readings he obtains. Ignore the effects of the resistance of the ammeter, voltmeter and battery.

voltmeter reading V

ammeter reading ..... A

(ii) What is the resistance of wire AC?

ANSWER: resistance of AC = ... Ω [3]

(c) Use your answer to **(b)** to answer the following questions.

(i) What is the resistance per metre of this wire?

ANSWER: resistance per metre = ... Ω/m

(ii) What length of wire does the laboratory technician need for the 64 Ω resistor?

ANSWER: length needed = ... m [3]

11 Here is a list of different types of waves.

gamma (γ)
infra-red
radio
sound
ultra-violet
visible
X-rays

(a) Which one of these is the only one which is **not** part of the electromagnetic spectrum?

.....[1]

(b) Which one of these makes us feel warm when the Sun shines?

.....[1]

(c) Which one of these do doctors use to detect broken bones?

.....[1]

(d) (i)

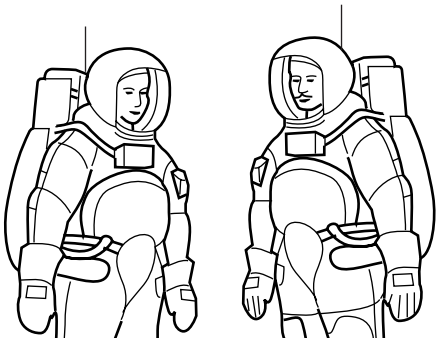


Fig. 11.1

On the moon, two astronauts cannot hear each other, even when they shout, unless they have their radios switched on.

1. Why cannot they hear each other even when they shout?

.....

.....

2. Why can they hear each other using their radios?

.....

.....

(ii) Which type of wave is used to carry messages from the astronauts to mission control on Earth?

.....[4]

12 The hammers A and B shown in Fig. 12.1 consist of steel hammer-heads of different weights fitted to identical wooden handles.

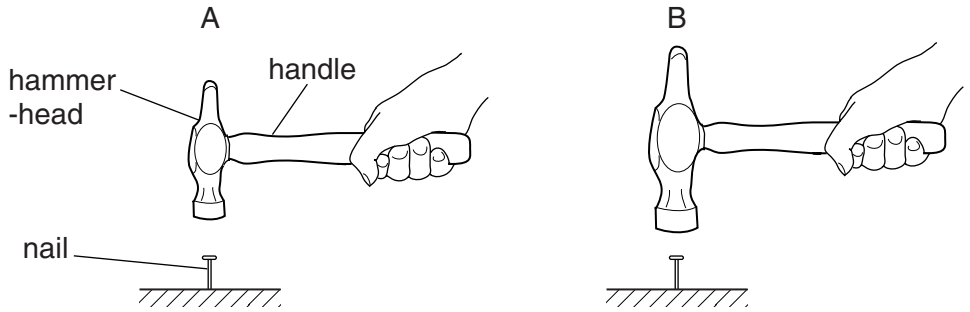


Fig. 12.1

(a) (i) Which hammer-head causes the greater moment about the end of the handle when the hammer is held horizontally, as shown in Fig. 12.1?

ANSWER: hammer .....

(ii) Explain your answer.

.....

.....[3]

(b) (i) Which hammer-head requires the greater work to lift it a distance of 30 cm from the position shown?

ANSWER: hammer .....

(ii) Explain your answer.

.....

.....[3]

(c) If you wanted to estimate the power developed when lifting hammer A through 30 cm, what two other quantities would you need to measure?

1. .....

2. .....[2]

(d) One of the hammers hits the nail and comes to rest without bouncing.

(i) What form of energy did the hammer lose when it came into contact with the nail?

.....

(ii) State two forms of energy into which this "lost" energy is changed.

1. .....

2. .....[3]

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